Software Completes the Medical Imaging Solution

— by John Phillips, Pleora Technologies

Software is an important part of medical imaging systems. Choosing the right combination of hardware and software allows manufacturers to speed time-to-market and lower costs, while also delivering differentiated performance and cost advantages to increase the value of their systems

Design Flexibility

By upgrading imaging systems with GigE Vision® or USB3 Vision™ video interfaces, imaging data is received using the Ethernet or USB 3.0 ports that already exist in most computing platforms. Freed of the need for a PC with a peripheral card slot, designers can choose smaller form factor computing platforms for control and analysis, such as embedded processors, single-board computers, laptops, and tablets, and employ a variety of operating systems.

This delivers two significant advantages. First, with a wider range of computing platforms to choose from, designers can more easily balance application requirements and cost concerns. Second, with a traditional PCI frame grabber designers are "locked in" to that vendor for support, relying on them to write drivers for specific operating systems and processing architectures. In comparison, nearly every modern hardware platform and operating system includes native support for Ethernet and USB 3.0.

In addition, GigE Vision and USB3 Vision software development kits (SDKs) are widely available that allow developers to produce video applications for a range of operating system and processor architectures. The right SDK reduces design time and costs by allowing manufacturers to easily develop functionality that can be modified to work on new operating systems, or receive video over a different interface types.

Enhanced, Streamlined Performance

One of the key performance advantages of GigE-based distributed network architectures is the ability to locate intelligent nodes at locations where data collection and control occurs. The Internet Group Management Protocol (IGMP), implemented universally as part of Ethernet devices, network interface cards (NICs), and switches, allows network elements to be part of one or more ad-hoc video distribution groups, where a single server can multicast its data to several clients.

In a hospital operating room, for example, the surgeon can use a single display screen as a dashboard to track real-time patient data from different imaging devices and systems. The video can also be transmitted to display panels for the OR scheduling staff, a conference room, multiple departments, and remote specialists.

At the transport layer, the server sends only one copy of the data to a network switch. The switch replicates the data for distribution to display panels and processing platforms as required. This ensures video distribution doesn't impact server performance. Leveraging Ethernet's inherent multicast capabilities, display and processing functions can be offloaded from a single device to multiple devices to help ensure reliability. This also helps GigE Vision cameras to multicast high-quality, uncompressed video to multiple display screens and processing nodes simultaneously with the lowest possible latency.

Simplifying Design with Standards

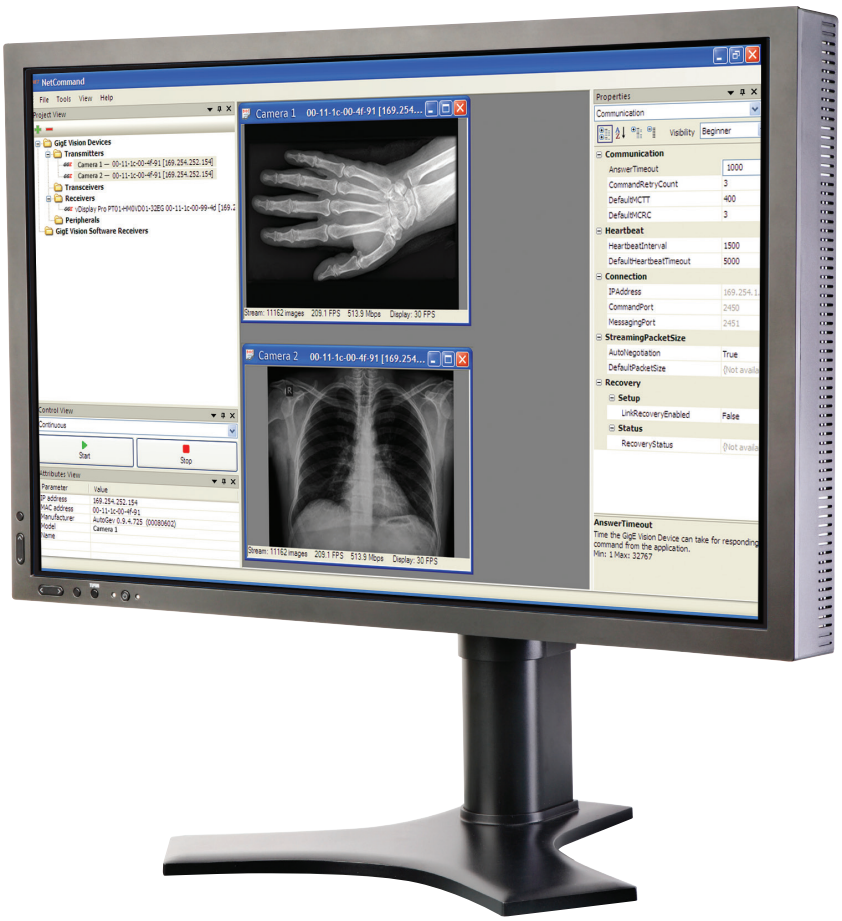
Standards compliance is an increasing consideration for hospital administrators as they seek scalable, multi-vendor solutions in place of purpose-built or proprietary designs.

GenICam™ is a global standard that defines a generic interface for the computer control of digital cameras and other imaging products that transmit video. GenICam has been incorporated in many video interface standards, including GigE Vision and USB3 Vision, and is supported by most leading vendors of high-performance cameras.

GenICam provides a generic programming interface for all types of cameras, no matter what interface technology is used or what features are implemented. An extended mark-up language (XML) file standardizes the name, type, and meaning of camera features or their use, and stores this information in a self-description file that is retrieved by the SDK when the camera is first connected to a system. GenICam also ensures "human readable" features can be reliably converted into device implementation-specific commands, by mandating that the naming of features adheres to the Standard Features Naming Convention (SFNC). For example, "gain" not "brightness" is used consistently regardless of manufacturer.

Many of the benefits delivered by GigE and USB3-based video interfaces for medical imaging systems, including design flexibility, lower costs, and increased performance, require a thorough understanding of the hardware and software components of the end-to-end solution. By choosing standards-compliant video interfaces to avoid vendor lock-in and ease design, and taking advantage of supporting SDKs, manufacturers can quickly and cost-effectively design or upgrade high-performance medical imaging systems. ✹

— ***John Phillips***
Senior Manager, Product Management
with Pleora Technologies



Standards-compliant video interfaces supported by software development kits allow manufacturers to quickly and cost-effectively implement or upgrade high-performance medical vision systems.